

Thermalization as an invisibility cloak for fragile quantum superpositions

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We propose a method for protecting fragile quantum superpositions in many-particle systems from dephasing by external classical noise. We call superpositions “fragile” if dephasing occurs particularly fast, because the noise couples very differently to the superposed states. The method consists of letting a quantum superposition evolve under the internal thermalization dynamics of the system, followed by a time-reversal manipulation known as Loschmidt echo. The thermalization dynamics makes the superposed states almost indistinguishable during most of the above procedure. We validate the method by applying it to a cluster of spins 1/2.